

Amendment under 37 CFR §1.111
Attorney Docket No.: 052267
Application No.: 10/528,265

AMENDMENTS TO THE CLAIMS

The listing of claims below replaces all prior versions of claims in the application.

1-3. (Cancelled)

4. (Withdrawn): A masking mechanism for a film forming apparatus, characterized in that:

it comprises a single mask and a means for moving the mask relative to a substrate in a uniaxial direction; and

said mask has a first and a second single action edge each of which has a normal unit vector and a double action edge in the form of a triangle having its base oriented in said uniaxial direction and its two other sides constituting action edges, wherein

the normal unit vector of said first single action edge makes an angle of 30°relative to said uniaxial direction and the normal unit vector of said second single action edge makes – 30°relative to said uniaxial direction.

5. (Withdrawn): A masking mechanism for a film forming apparatus as set forth in claim 4, characterized in that

said single mask comprises a single disk having a first and a second cutout, and

said first cutout is a cutout in the form of a fan having its two sides making angles of 30°and – 30°relative to a circumferential direction of said disk, respectively, and said second

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cutout is a cutout having sides making angles of 60°and – 60°relative to the circumferential direction of said disk and a side oriented parallel to said circumferential direction.

6. (Withdrawn): A masking mechanism for a film forming apparatus, characterized in that:

it comprises a single mask and a means for moving the mask relative to a substrate in a uniaxial direction; and

said mask has a triangular opening having a base side oriented in a said uniaxial direction, said mask also having a side extending orthogonal to said uniaxial direction; and

the other two sides other than the base side of said triangular opening and said side orthogonal to said uniaxial direction constitute a triple action edge, whereby

selecting a rate of movement at which said triangular opening is moved and a rate of movement at which said side orthogonal to said uniaxial direction allows a film thickness gradient to be produced in a particular direction determined by the rates of movement selected.

7. (Withdrawn): A masking mechanism for a film forming apparatus as set forth in claim 6, characterized in that

said single mask is a single disk;

said disk has a first cutout, and a second cutout or a first opening;

said first cutout is a fan shaped cutout, said second cutout is a cutout having a side extending orthogonal to a circumferential direction of said disk, and said first opening is a

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triangular opening having a base side extending parallel to a circumferential direction of said disk; and

the two sides of said fan shaped cutout and the side of said second cutout that extends orthogonal to a circumferential direction of said disk constitutes said triple action edge, or the two sides of said triangular opening other than said base side and the side of said second cutout that extends orthogonal to a circumferential direction of said disk constitutes said triple action edge.

8. (Currently Amended): A masking mechanism for a film forming apparatus, comprising:

a mask; and

a means for moving the mask in one direction on a straight line above or beneath a substrate;

wherein said mask has a periphery orthogonal to said straight line, and a first and a second openings,

said first opening has a first edge making an angle of 30° to said straight line, said second opening has a second edge making an angle of -30° to said straight line,

said periphery has a length which is sufficiently large relative to a region of equilateral triangle in said substrate,

each of said first and second edges has a length which is sufficiently large relative to said region of equilateral triangle in said substrate, and

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when said means for moving moves said mask above or beneath said substrate, the movement of said periphery determines a film thickness gradient of a first material, the movement of said first edge determines a film thickness gradient of a second material, and the movement of said second edge determines a film thickness gradient of a third material, thereby a ternary phase diagrammatic system thin film is deposited on said region of equilateral triangle in said substrate.

9. (Currently Amended): A masking mechanism for a film forming apparatus, comprising:

a mask; and

a means for moving the mask in one direction on a straight line above or beneath a substrate;

wherein said mask has a periphery making an angle of α (wherein $0^\circ \leq \alpha < 90^\circ$) to said straight line, and a first and second openings,

said first openings opening has a first edge making an angle of $30^\circ + \alpha$ to said straight line, said second opening has a second edge making an angle of $-30^\circ + \alpha$ to said straight line,

said periphery has a length which is sufficiently large relative to a region of equilateral triangle in said substrate,

each of said first and second edges has a length which is sufficiently large relative to said region of equilateral triangle in said substrate, and

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when said means for moving moves said mask above or beneath said substrate, the movement of said periphery determines a film thickness gradient of a first material, the movement of said first edge determines a film thickness gradient of a second material, and the movement of said second edge determines a film thickness gradient of a third material, thereby a ternary phase diagrammatic system thin film is deposited on said region of equilateral triangle in said substrate.

10. (New): A masking mechanism for a film forming apparatus, comprising:

a mask; and

a means for moving the mask in one direction on a straight line above or beneath a substrate;

wherein said mask has a periphery orthogonal to said straight line, and a first and a second openings,

said first opening has a first edge making an angle of 30° to said straight line, said second opening has a second edge making an angle of -30° to said straight line,

said periphery has a length which is sufficiently large relative to a region of equilateral triangle in said substrate,

said first opening has a size which is sufficiently large relative to said region of equilateral triangle in said substrate,

said second opening has a size which is sufficiently large relative to said region of equilateral triangle in said substrate, and

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when said means for moving moves said mask above or beneath said substrate, the movement of said periphery determines a film thickness gradient of a first material, the movement of said first edge determines a film thickness gradient of a second material, and the movement of said second edge determines a film thickness gradient of a third material, thereby a ternary phase diagrammatic system thin film is deposited on said region of equilateral triangle in said substrate.

11. (New): A masking mechanism for a film forming apparatus, comprising:
a mask; and
a means for moving the mask in one direction on a straight line above or beneath a substrate;

wherein said mask has a periphery making an angle of α (where $0^\circ \leq \alpha < 90^\circ$) to said straight line, and a first and a second openings,

said first opening has a first edge making an angle of $30^\circ + \alpha$ to said straight line, said second opening has a second edge making an angle of $-30^\circ + \alpha$ to said straight line,

said periphery has a length which is sufficiently large relative to a region of equilateral triangle in said substrate,

said first opening has a size which is sufficiently large relative to said region of equilateral triangle in said substrate,

said second opening has a size which is sufficiently large relative to said region of equilateral triangle in said substrate, and

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when said means for moving moves said mask above or beneath said substrate, the movement of said periphery determines a film thickness gradient of a first material, the movement of said first edge determines a film thickness gradient of a second material, and the movement of said second edge determines a film thickness gradient of a third material, thereby a ternary phase diagrammatic system thin film is deposited on said region of equilateral triangle in said substrate.

12. (New): A method of making a thin film, using a masking mechanism comprising:
a mask; and
a means for moving said mask in one direction on a straight line above or beneath a substrate;

wherein said mask has a periphery making an angle of α (where $0^\circ \leq \alpha \leq 90^\circ$) to said straight line, and a first and a second openings,

said first opening has a first edge making an angle of $30^\circ + \alpha$ to said straight line, said second opening has a second edge making an angle of $-30^\circ + \alpha$ to said straight line, and further including the steps of:

positioning said periphery of said mask immediately before the region where a thin film of ternary phase-diagrammatic system is to be formed,

moving said mask linearly while a first material is evaporated so that said periphery forms film thickness gradient of the first material,

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moving said mask linearly continuously until said first action edge of said mask is positioned immediately before the region where the thin film of ternary phase-diagrammatic system is to be formed,

moving said mask linearly while a second material is evaporated so that said first action edge of the mask forms film thickness gradient of the second material,

moving said mask linearly continuously until said second action edge of said mask is positioned immediately before the region where the thin film of ternary phase-diagrammatic system is to be formed, and

moving said mask linearly while a third material is evaporated so that said second action edge of the mask forms film thickness gradient of the third material.

13. (New): The method of making a thin film as set forth in Claim 12,

wherein said periphery has a length which is sufficiently large relative to a region of equilateral triangle in said substrate,

said first opening has a size which is sufficiently large relative to said region of equilateral triangle in said substrate, and

said second opening has a size which is sufficiently large relative to said region of equilateral triangle in said substrate.